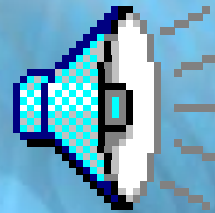


North Carolina is Ready to RUMBLE

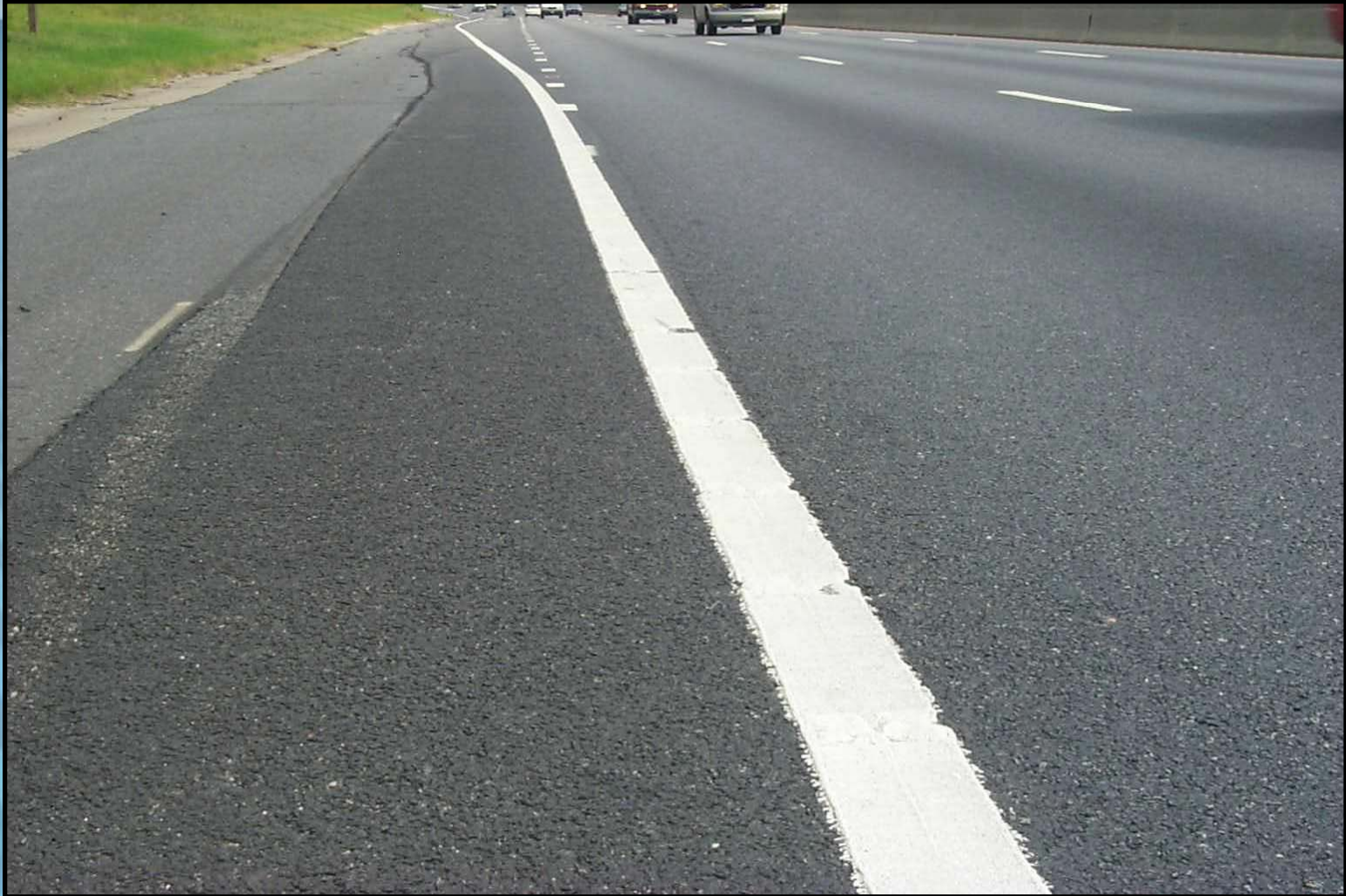


Anthony D. Wyatt

Traffic Engineering & Safety Systems Branch

September 2004

Saving Lives by Preventing Run off Road Crashes




Roadside Crashes account for 1/3 of all US Highway Fatalities

Source:

Strategies for Improving Roadside Safety

Research Results Digest 220

Transportation Research Board

The background is a blurred blue image with vertical motion lines and a faint, larger-scale gear-like pattern. The text is centered in a bold, black, sans-serif font.

**Not all the adverse
conditions are outside the
vehicle**

What is Going On in That Car?

- Sleep - Fatigue - Food Coma
- Distraction
 - Social
 - Operational
- Impairment
 - Medical
 - Substance
 - Emotional



FG +0.0

SG +0.0

Time -10.00

Rear View

Strategic Approach to Safety

- Information & Investigation Based
- Systemic (“Holistic” *footnote Lori Cove TPB*)
- NC Executive Committee for Highway Safety - TEAM EFFORT
- AASHTO Strategic Highway Safety Plan
- Roadway - Driver - Vehicle
- 4 E’s - Engineering, Enforcement, Emergency Response, & Education

SAFETY



What's New

Professional Resources

[Programs](#)

[Facts and Data](#)

[Training and Education](#)

[Media Center](#)

Road User Resources

[Programs](#)

[Media Center](#)

News and Events

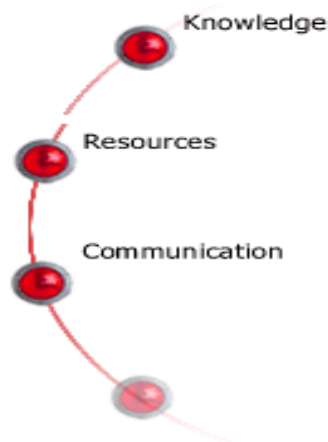
[Press Room](#)

[Newsletter](#)

[Ongoing Programs](#)

[Safety Resources](#)

Run-Off-Road:



Rumble Strips

- [FHWA Technical Advisory: Roadway Shoulder Rumble Strips](#)
- Synthesis Study prepared for the FHWA that summarizes the current state of the practice nationwide on the use of shoulder rumble strips. ([HTML](#) | [Word](#))



Six Life-Saving Strategies

We focus on these three objectives through implementing six highway safety improvement strategies. State and local transportation agencies can join in the nationwide effort to stem the highway death toll by focusing on their problem areas and implementing similar strategies.

- 1 **Encourage strategic safety programs** at State, local and metropolitan planning organization (MPO) levels, so that safety consciousness is a routine part of project planning, development and operations.
- 2 **Protect vehicle occupants** through Federal, State and local campaigns to increase seat belt usage. A NHTSA study found that three-point seat belts reduce fatalities by 45% in passenger car crashes and 60% in light-truck crashes.
- 3 **Prevent roadway departure crashes** through programs to identify and correct deficiencies in sign and pavement marking visibility; to install shoulder and centerline rumble strips; to promote skid resistant pavements; and to pave shoulders and eliminate edge drop-offs.
- 4 **Minimize the consequences of roadway departures** by implementing programs to create and maintain clear roadsides; to improve the crashworthiness of roadside hardware and barriers; to improve roadway and roadside safety design; and to provide training in Roadside Safety Design.
- 5 **Conduct comprehensive intersection analyses** to pinpoint safety problems and develop cost-effective solutions. Evaluate a targeted set of intersections, and budget for improvements such as signalization, signing, pavement marking, and channelization or turn lanes.
- 6 **Develop a comprehensive approach to pedestrian safety**, including comprehensive programs to increase awareness of pedestrian safety issues; to provide pedestrian safety training; to improve roadway designs to more safely accommodate pedestrian needs; and to emphasize the need for pedestrian safety planning by MPOs and other planning organizations.



Strategic Highway Safety Plan

American Association of State Highway and Transportation Officials
and the National Cooperative Highway Research Project

About This Site

The Strategic Highway Safety Plan

The Six Elements of the Plan

Drivers

Special Users

Vehicles

Highways

Emergency Medical Services

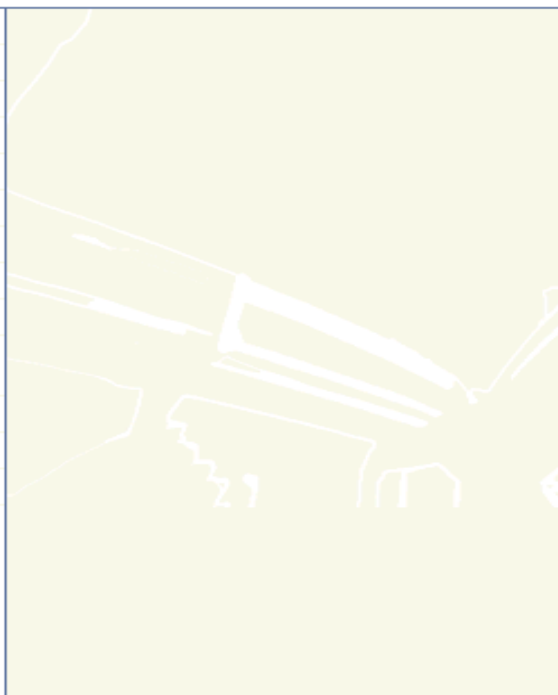
Management

Implementation Guides (IICHRP Report 500)

Appendixes & Guides Map

Press Room

Site Map



This site is maintained by AASHTO with funding from Project 17-18(2) of the National Cooperative Highway Research Program



Best Practices Headlines

9/1/2004

[VIRGINIA Safety corridor eyed for I-95](#)

9/1/2004

[ALABAMA Riley looks to counties for help](#)

8/31/2004

[NEBRASKA 'You Drink and Drive, You Lose'...](#)

8/24/2004

[ARIZONA On road to improving senior driving](#)



New Headlines

9/1/2004

[AAA Encourages Motorists to Be Alert When...](#)

9/1/2004

[PENNSYLVANIA Seat Belt Use Reaches Record High...](#)

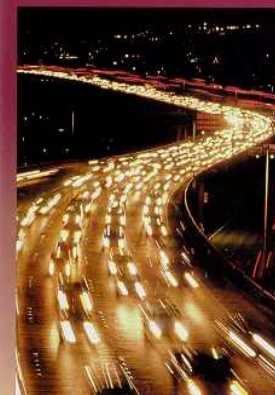
9/1/2004

[Deadliest states for driving](#)

8/23/2004

[LOUISIANA Newly passed laws go on the books today](#)

AASHTO Strategic Highway Safety Plan



A Comprehensive Plan to
Substantially Reduce
Vehicle-Related Fatalities and
Injuries on the Nation's Highways

NC's Three (3) Pronged Safety Approach

- Treat Prioritized Locations with Safety Problems First
- Systematically Treat Other Locations
- Update Policies and Design Guidance to Include these Important Features



**Roadside appurtenances
often serve as “rumble”
strips**

The Bleeding Edge

- Early on NC Recognized Potential Benefit of Rumblestrips
- Variety of Treatments tried
- Implementation was at best Fragmented in terms of coverage, placement, and type
- NC leaned toward intermittent raised treatments (I-95)









No Rumblestrip



Intermittant Concrete Rumblestrip



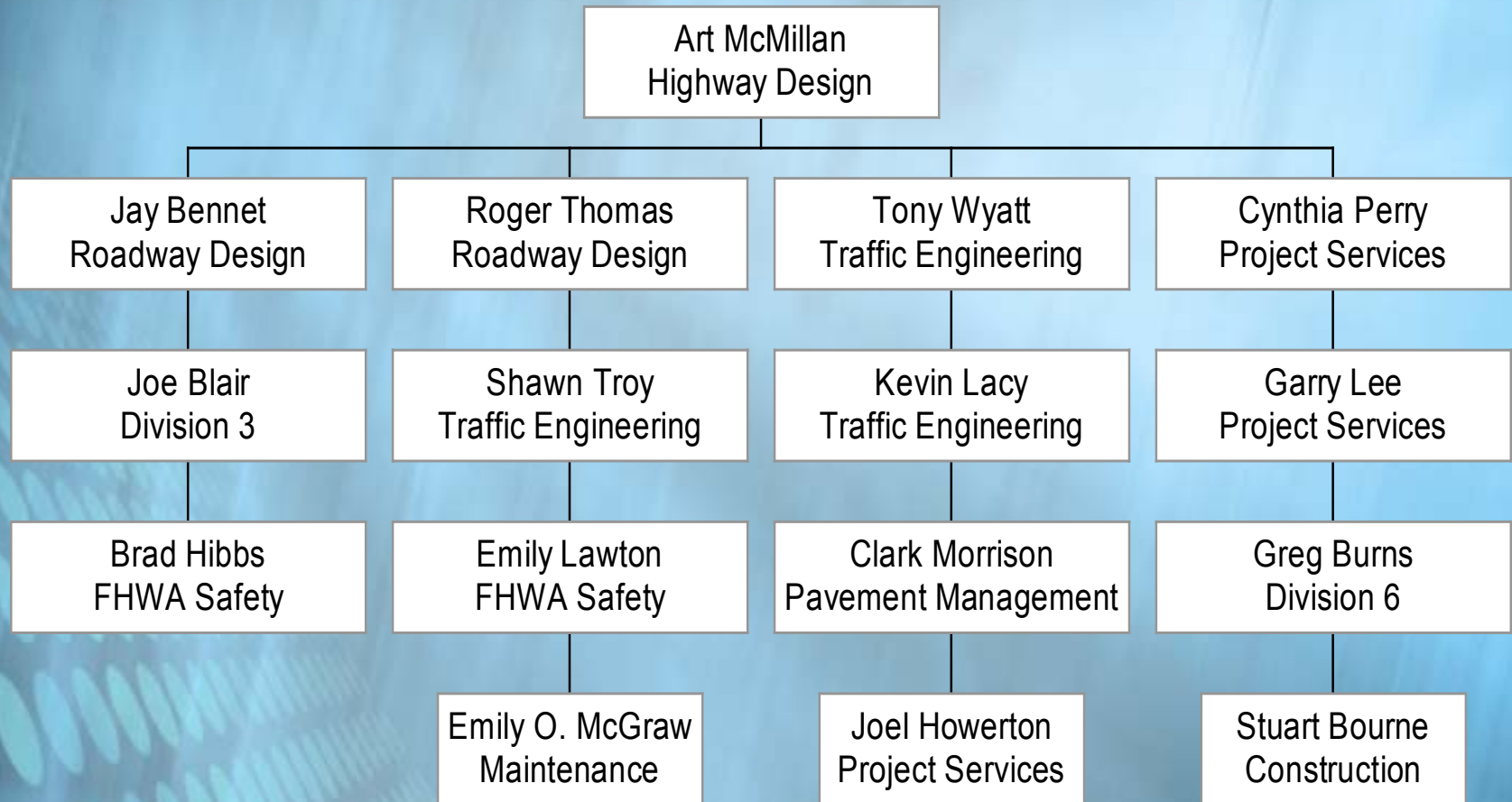
Milled Rumblestrip

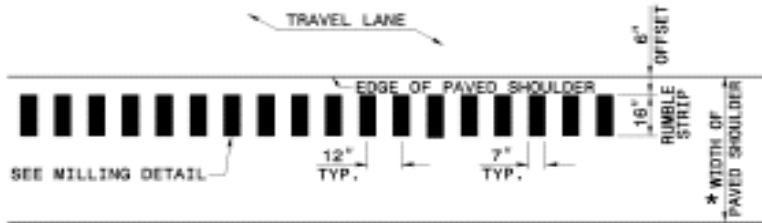


NC Rumblestrip Committee

- Update Design Manual Guidelines
- Update Design Detail Drawings
- Goal Improve SAFETY
- Goal Improve Guidance & Consistency
- Team Members

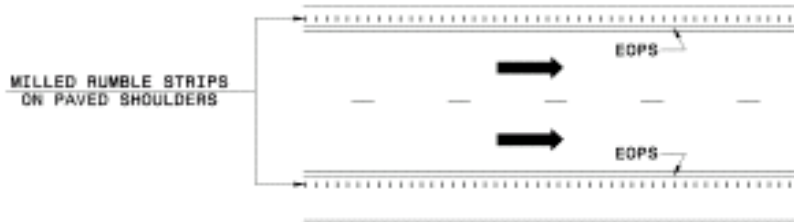
NC Rumblestrip Committee



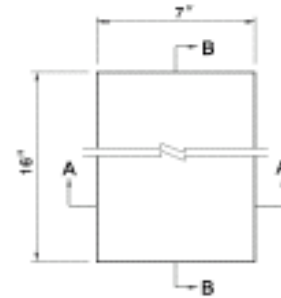


* FOR WIDTHS SEE TYPICAL SECTIONS AND PLAN SHEETS

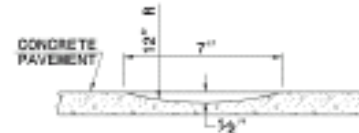
PLAN VIEW
PAVED SHOULDER



LANE TREATMENT



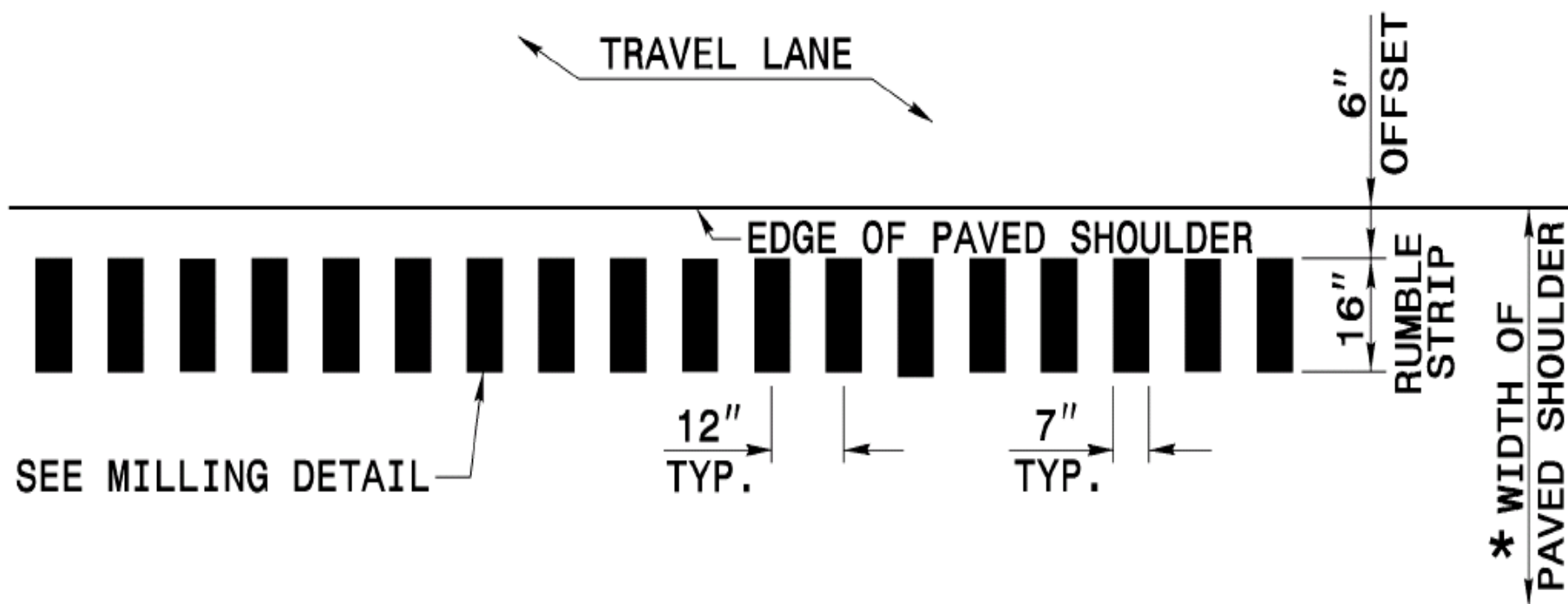
PLAN VIEW
MILLING DETAIL



SECTION A-A



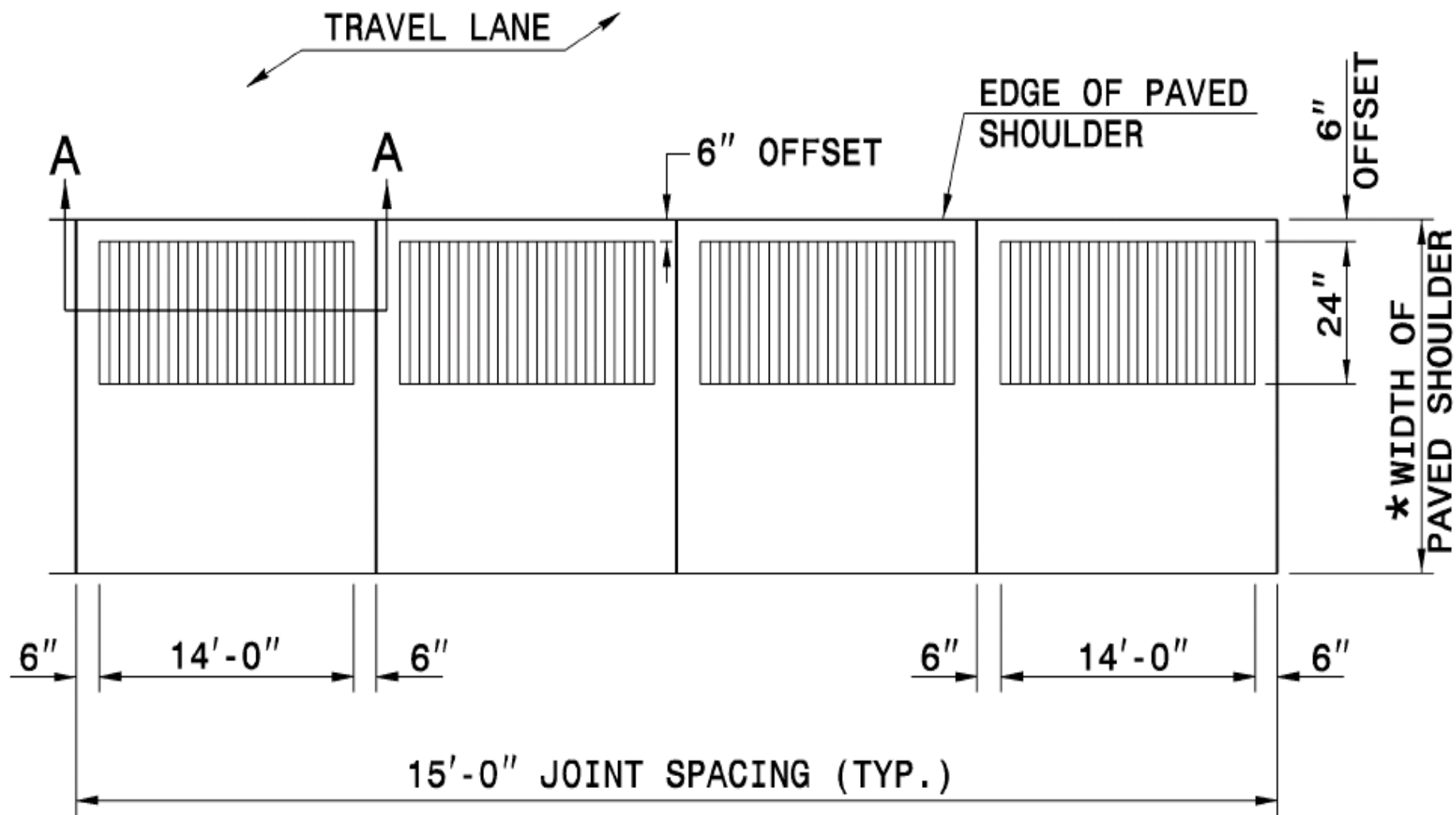
SECTION B-B



* FOR WIDTHS SEE TYPICAL SECTIONS AND PLAN SHEETS

PLAN VIEW
PAVED SHOULDER





PLAN VIEW
PAVED SHOULDER

Historical Use of Freeway Shoulder Rumblestrips in NC

- Initially Focus was on FATIGUE on long through trips
- Guidance discouraged use on just about all freeways except rural mainline freeways
- Emphasized visual advantage of traverse thermo

Old Policy and Design Guidance

- Offset too far off Edgeline
- Basically only allowed on rural freeways
- inconsistent - placement & treatments
- Did not address centerline or rumblestripe treatments

GUIDELINES FOR SENSORY WARNING TREATMENT¶

▪ FOR PAVED SHOULDERS.....1-4P¶

¶

→ The purpose of these guidelines is to provide the Highway Design Branch and Traffic Engineering and Safety Systems Branch opportunities when using paved roadway shoulders. . . This policy provides guidelines for determining sections of shoulders on Interstate and other freeways where special surface treatments are desirable and would be cost-effective if the potential reduction in maintenance costs is considered. . . This policy also discusses different types of surface treatments and selection for various types and widths of paved shoulders.¶

¶

→ It is the responsibility of the State Highway Design Engineer and the Director of Traffic Engineering and Safety Systems to ensure that the following guidelines are followed and applied consistently within their respective area of operation.¶

¶

→ Generally, surface treatments should be used on the median shoulder and right shoulder at locations where surface treatments are desired. . . Shoulder surface treatment would not typically be required on median shoulders when paved medians and median barriers are used. . . It is not necessary to use the same surface treatment on the median and right shoulders. . . However, the most effective shoulder treatments available should be considered.

▪ GUIDELINES FOR SENSORY WARNING TREATMENT

.....FOR PAVED SHOULDERS (continued)..... 1-4P

¶

.....Rumble strips are to be used on the following roadways: ¶

¶

▪ → Interstate through routes ¶

→ Rural Freeway Segments ¶

→ Expressway segments that are located in sparsely developed rural areas. ¶

¶

→ Rumble Strips will not be used on the following roadways: ¶

¶

→ Urban Freeways and loop projects around urban areas. ¶

→ Non-Freeways with the exception as listed above. ¶

¶

New Philosophy on Use of Freeway Shoulder Rumblestrips

- Fatigue, Impairment, & Distraction
- Navigational Advantages during adverse weather conditions
- Emergency Responders and Law Enforcement along shoulders
- Moth Effect
- Give Motorist a chance to recover
- Hopefully avoid some appurtenance hits

New (Draft) Policy and Design Guidance

- Committee Changes to Roadway Design Manual (draft)
- Improved Placement (closer to edge line)
- Continuous
- Includes additional guidance and flexibility

New Draft Policy

before they leave the roadway and strike a roadside barrier or hazard.¶

¶

→ It is the responsibility of the State Highway Design Engineer, the State Traffic Engineer, and the Chief Engineer of Operations to ensure that the following guidelines are followed and applied consistently within their respective area of operation.¶

¶

→ Generally, rumble strips should be used on both the median and outside shoulder at locations where they are required. It is not necessary to use the same type of rumble strips on the median and outside shoulders. The placement of Rumble Strips on existing roadways should be investigated to verify the shoulder width and pavement structure are sufficient. On roadway facilities designated as bike routes, the placement of Rumble Strips should be coordinated with the Bicycle and Pedestrian Division. Milled rumble strips are not recommended on structures.¶

¶

Rumble strips are to be used on the following types of Median Divided Roadways:¶

¶

▪ → Interstate / Freeway¶

→ Expressway (Where access is limited to at-grade intersections)¶

¶

New Draft Policy

ROADWAY DESIGN MANUAL (DRAFT)

PART I

▪ GUIDELINES FOR RUMBLE STRIPS¶

FOR PAVED SHOULDERS (continued)..... 1-4P¶

¶

Rumble Strips should also be considered on other Roadway Facilities¶

¶

- → Where documented histories of lane departure type crashes exists.¶

¶

- → Rural median divided facilities with partial control of access (where designated driveway and street access points are allowed) should be considered on a case by case basis.¶

¶

Placement of Rumble Strips on other Roadway Facilities¶

¶

- → The width of shoulder rumble strips may vary depending on the width of the paved shoulder provided. The Engineer should determine design and placement.¶

¶

- → The width and placement of centerline rumble strips may vary depending on the lane width and pavement marking type and use. The Engineer should determine the design and placement.¶

A Fundamental Feature in the Freeway Road System

- Pavement, Surface, Lanes & Shoulders
- Delineation (Pavement Markings)
- Signage
- Roadside Appurtenances
- Rumblestrip

Costs

- Dependent on Many Factors.
- Even with Mobilization and Traffic Control Costs they are Very Cost and Safety Effective (20:1 and higher).
- Conservative Estimates for retrofit of 10 mile long segments of Existing Freeway (4 lines concrete shoulders) approx. \$17,500.00 per mile.

$$\text{\$0.18/LF} \times 5280/\text{mile} \times 4 = \text{\$3800/mile}$$

$$\text{Misc \& Mob } 15\% = \text{\$4370.00}$$

$$\text{E \& C } 15\% = \text{\$5,027}$$

$$\text{Say } \boxed{\text{\$ 5100/mile}}$$

(estimated for four (4) lines asphalt shoulders)

Getting it Done

- Hazard Elimination - Statewide W Project
- 3R (Resurfacing, Rehabilitation & Restoration) Projects
- IM Projects & TIP Projects
- Spot Safety, Small Construction, & Contingency
- Moving Ahead



North Carolina Department of Transportation

Michael F. Easley • Governor Lyndo Tippet • Secretary of Transportation

August 6, 2004

Release No: 386

N.C. BOARD OF TRANSPORTATION APPROVES ADDITION OF 46 RUMBLE STRIP PROJECTS *Projects Will Improve Highway Safety Across the State*

Raleigh ---The N.C. Board of Transportation approved adding 46 rumble strip projects to the 2004-2010 Transportation Improvement Program (TIP) at its monthly meeting on Thursday, August 5 in Raleigh. The TIP is the N.C. Department of Transportation's (NCDOT's) seven-year blueprint for transportation projects. With these new projects, the department will invest an additional \$7.1 million over the next two years in the installation of rumble strips on major highways across the state. (A full list of projects is attached).

Studies show that rumble strips can reduce the number of single vehicle run-off road (ROR) type crashes by up to 50 percent, saving numerous lives and millions of dollars in damage every year. According to statistics from the National Highway Traffic Safety Administration (NHTSA), drivers who are drowsy or inattentive are a contributing factor in approximately 38 percent of these crashes. In addition, ROR crashes that involve drowsy or inattentive drivers are three to five times more severe than other types of ROR crashes.

"NCDOT's highest priority is ensuring the safety of motorists on the state's highways," said Transportation Secretary Lyndo Tippet. "Rumble strips have a proven record of success, and the addition of these new projects will help reduce the number of crashes across the state."

Statewide W Projects for Rumblestrips

- 46 safety b to c prioritized projects
- Approximately \$7.1 Million
- Hazard Elimination Funding
- FY 2005 - 2006
- Accomplished Through Advance Funding of Anticipated Future Federal Funds

Important Considerations

- Bicycling Community (non-freeway)
- Travel Lane Surface Quality
- Noise - Debris - Drainage
- Shoulder Condition
- Need for Coordination with Scheduled Upgrades, Resurfacing, etc.
- Treatments for intersections and driveways (non-freeway)

Rumblestrips are an important Tool in our Life Saving Tool Box.

Rumblestrips won't prevent all encroachments off the travelway but they provide operators with an important chance to react & recover.

Rumblestrips are just one part of the **SYSTEM.**

A.D. (Tony) Wyatt, PE, PTOE
Traffic Engineering & Safety
Systems

awyatt@dot.state.nc.us
(919) 733-1593

